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comprehend a mastery plan for
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THESIS

Ability of Third Grade Children to Comprehend a Mastery Plan for Addition, Carry it through Consistently and Improve by it.

Submitted by

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B.S. in Ed. --- Boston University 1926

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. . . .

ABILITY OF THIRD GRADE CHILDREN TO COMPREHEND A MASTERY PLAN FOR ADDITION, CARRY IT THROUGH CONSISTENTLY AND IMPROVE BY IT.

I have chosen as the subject of my thesis "Ability of Third Grade Children to Comprehend a Mastery Plan for Addition, Carry it through Consistently and Improve by it". In this problem I have worked with my own class of pupils, thirty-eight of whom remained with me from September to June. During the previous year, these children had followed a course of study which included the discovery of all addition, subtraction, multiplication and division facts through 20; the expression by figures and symbols of the facts discovered; and abstract drill in the addition facts through 10 - 10 and in the subtraction facts through 20 - 10.

It was an unselected group. A rank list of the group was secured by the use of the Haggerty Intelligence Examination - Delta 1. The pupils appeared to range from an intelligence quotient of 76 to an intelligence quotient of 132. On this supposition, the class median was 106.44. (See Figure 1 on following page.)

At the beginning of the year, a short time was devoted to review of the work of the previous year for the purpose of recalling the addition facts forgotten during the summer vacation. The pupils appeared to have retained the easier primary combinations very well and the difficult and zero combinations fairly well. However, there was often considerable uncertainty as to the answers. Undesirable habits began to show up. When in doubt, eleven of the pupils secured an answer by 'counting on' the number to be added on; eight of the pupils counted on their fingers; two pupils used the figures on their rulers; one boy made practical use of the buttons on his blouse; and I was not at

Distribution of 38 Third Grade Pupils according to Approximate I.Q.'s as Estimated by Haggerty Intelligence Examination - Delta I.

....

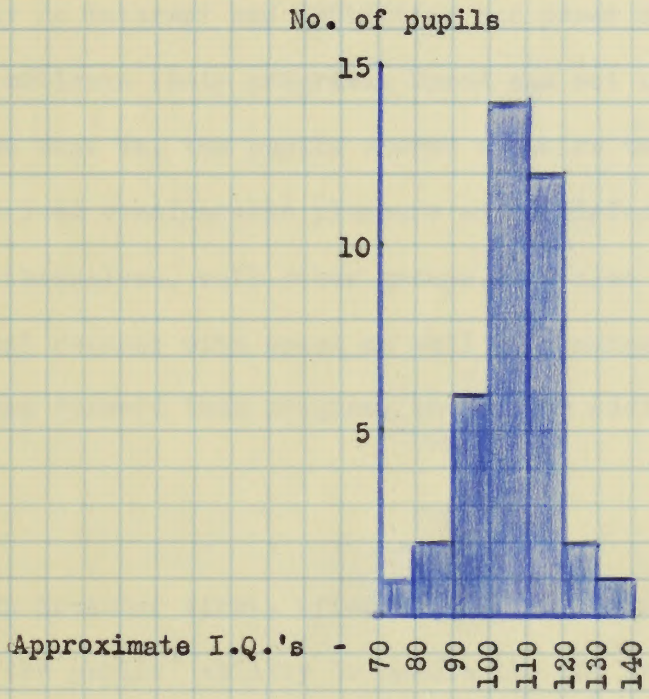


Figure 1 - To secure a rank list of the 38 pupils in the unselected third grade group worked with in this study, the Haggerty Intelligence Examination - Delta 1 - was given. The above graph shows the distribution of approximate I.Q.'s as determined by this examination. The graph is to be read as follows: Out of 38 pupils taking the examination, one pupil made a score which indicated an I.Q. between 70 and 80; two pupils appeared to have an I.Q. between 80 and 90; six pupils appeared to have an I.Q. between 90 and 100; etc. The approximate intelligence score for the group appeared to be 106.44.

all sure that other less obvious ways of 'counting on' were not being used, as the answers were often too slow in coming for automatic response. Hesitation and fear of failure were also noticeable. To eradicate these undesirable habits and to establish and strengthen desirable ones which would lead to 100 % accuracy in the fundamental facts of addition and in the process difficulties encountered in addition was my problem. It was also my problem to meet these needs in such a way that the pupils would understand and accept the 100 % accuracy standard and display an interest and initiative and power of self-direction that would motivate their progress. Speed was not emphasized at first; but as time went on, the pupils showed a desire to increase their speed and derived considerable pleasure and satisfaction from little contests among themselves, with other groups, and also in beating their own individual records with speed as well as accuracy as an objective. In carrying forward this program, the Wilson Addition Drill Service was used.

. . . .

On November first, after the initial period of review drill during which the pupils' ability to handle the 100 primary addition facts was determined solely by the teacher's estimate of the daily work and working habits, the Wilson 3A Addition Test was given, testing the "easier primary combinations". The findings of this test are listed in Tables 1A and 1B. The accuracy scores showed a range of from 80 to 100, a median of 100, and an average deviation of 1.55. The speed scores showed a range of from 4 to 12 minutes, a median of 7 minutes, and an average deviation of 1.57 minutes.

A few days later, on November eighth, the Wilson 3B Addition Test was given, testing the "difficult and zero combinations". The findings in this test are listed in Tables 2A and 2B. The accuracy scores showed a range of from 87 to 100, a median of 99, and an average deviation of 2.

TABLE 1 A

3A Addition ... Accuracy ... First Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100	M	21	0	0	0
99		6	- 1	- 6	6
98		6	- 2	- 12	24
97		1	- 3	- 3	9
96		1	- 4	- 4	16
93		1	- 7	- 7	49
92		1	- 8	- 8	64
80		1	- 19	- 19	361
		N = 38			38)529(13.9210

……

Range = 80 to 100

Median = 100

S.D. = $\sqrt{13.9210}$ = 3.73

A.D. = 38)59(1.55

Table 1 A - Showing distribution of 38 third grade pupils in accuracy in the "easier primary combinations" on Nov. 1st. (Wilson 3A Addition Test)

This table is to be read as follows: Out of 38 pupils taking the test, 21 pupils had an accuracy score of 100 %; 6 pupils had an accuracy score of 99; etc. The accuracy scores for the group ranged from 80 to 100; the median performance for the group was 100; the average deviation of the group was 1.55.

TABLE 1 B

3A Addition ... Speed (minutes) ... First Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
12		1	5	5	25
11		1	4	4	16
10		1	3	3	9
9		2	2	4	8
8		8	1	8	8
7	M	8	0	0	0
6		4	- 1	- 4	4
5		7	- 2	- 14	28
4		6	- 3	- 18	54
		N = 38			38)152(4

....

Range = 4 to 12 minutes

Median = 7 "

S.D. = $\sqrt{4}$ = 2 minutes

A.D. = 38)60(1.57 "

Table 1 B - Showing distribution of 38 third grade pupils in speed in the "easier primary combinations" on Nov. 1st. (Wilson 3A Addition Test)

In this table, 1 pupil had a speed score of 12 minutes; 1 pupil had a speed score of 11 minutes; etc. The speed scores for the group ranged from 4 to 12 minutes; the median performance for the group was 7 minutes; the average deviation of the group was 1.57 minutes.

TABLE 2 A

3B Addition ... Accuracy ... First Testing

Score	Frequency	Deviation	F.D.	F.D.^{2}
100	13	1	13	13
99	M 7	0	0	0
98	6	- 1	- 6	6
97	3	- 2	- 6	12
96	2	- 3	- 6	18
95	1	- 4	- 4	16
94	3	- 5	- 15	75
93	1	- 6	- 6	36
91	1	- 8	- 8	64
87	1	- 12	- 12	144
	N = 38			38)384(10.10

……

Range = 87 to 100

Median = 99

S.D. = $\sqrt{10.10} = 3.17$

A.D. = 38)76(2

Table 2 A - Showing distribution of 38 third grade pupils in accuracy in the "difficult and zero combinations" on Nov. 8th. (Wilson 3B Addition Test)

This table is to be read as follows: Out of 38 pupils taking the test, 13 pupils had an accuracy score of 100 %; 7 pupils had an accuracy score of 99; etc. The accuracy scores of the group ranged from 87 to 100; the median performance of the group was 99; the average deviation of the group was 2.

TABLE 2 B

3B Addition ... Speed (minutes) ... First Testing

Score	Frequency	Deviation	F.D.	F.D.^{2}
15	1	7	7	49
14	1	6	6	36
13	2	5	10	50
12	2	4	8	32
11	1	3	3	9
10	6	2	12	24
9	5	1	5	5
8 M	9	0	0	0
7	5	- 1	- 5	5
6	5	- 2	- 10	20
5	1	- 3	- 3	9
	N = 38			38)239(6.2894

……

Range = 5 to 15 minutes

Median = 8 "

S.D. = $\sqrt{6.2894}$ = 2.507 minutes

A.D. = 38)69(1.815 "

Table 2 B - Showing distribution of 38 third grade pupils in speed in the "difficult and zero combinations" on Nov. 8th. (Wilson 3B Addition Test)

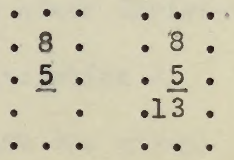
In this table, 1 pupil made a speed score of 15 minutes; 1 pupil made a speed score of 14 minutes; etc. The speed scores for the group ranged from 5 to 15 minutes; the median performance of the group was 8 minutes; the average deviation of the group was 1.82 minutes.

The speed scores showed a range of from 5 to 15 minutes, a median of 8 minutes, and an average deviation of 1.815 minutes.

The results of these two tests were discussed with the group. At this time I laid before the children the plan of the Wilson Addition Drill Service with its aim of 100 % accuracy. Their desire for mastery was aroused. The relative value of speed was discussed. Desirable and undesirable habits were discussed. There was considerable enthusiasm. The class accepted the 100 % goal as something worth trying for. Plans were made for improving our work. We began by having each pupil note his individual errors in the 3A and 3B tests. We agreed that each pupil ought to work away by himself and also that the children should do all they could to help each other, so that when the tests were given later on, everyone would get 100 % and in much less time. I explained that there would be new things coming up from time to time that they would need to learn and that I would help them with these; and I said I would also help them to find out why their answers were wrong if they could not find out by themselves. At the same time, I explained how each pupil could teach himself, how he could do his own drilling and testing and checking up on his progress. We decided to try out the Wilson Addition Drill Service for a while to see if it helped us.

After the Drill Service had been accepted, the work of the group was guided by the following principles:

1. Presentation of work in appropriate units as outlined in Drill Service.
2. Distribution of drill according to relative difficulties of facts and processes.
3. Individual errors and particular needs recorded.
    a) Individual sets of cards for self-drill and use with partners. These cards made by pupils. One side with answer, other side without.



b) Board work under teacher's supervision.

Pupil not left to himself until any new process is understood.

c) Teacher's summary and diagnostic chart of individual errors.

See Tables 6 and 12.

4. Constant checking up of his own work by the pupil.

a) Tracing paper answers with Wilson Addition Tests to check accuracy.

b) Timing himself to notice gain in speed.

c) Graphs of individual progress.

5. Observance of laws of memory.

a) Appealing situations set by teacher to arouse interest and attention.

1) Games. (See bibliography No. 5)

2) Contests between groups, with other classes, etc.

3) Individual books made with each pupil's 100 % accuracy papers.

b) Drill periods of right length to avoid fatigue and waning of interest.

c) Recall and use of content at gradually lengthened intervals.

d) Accuracy always; avoiding opportunities for incorrect responses.

e) Automatic response.

Pupil not permitted to stop to 'think'; upon slightest hesitation, child is told or is allowed to look at answer to combination; for this reason, answers to combinations always available.

When the work in column addition was introduced, the pupils realized the need for quick response in the upper decade combinations upon which they had been working in preparation for this new process difficulty. They now attacked these upper decade facts with renewed vigor; and after Christmas, they wished to try the Wilson tests containing these facts which I had showed them. On January fourth, the Wilson 3C Addition Test was given,

testing the "300 decade combinations to 39 + 9". The length of this test made it undesirable for the children to attempt its completion at one sitting. Three periods of time were used with suitable intervals between. Two weeks later, January eighteenth, the Wilson 3D Addition Test was given, testing the "175 decade combinations as needed for carrying in multiplication up to 9 x 9". This test was completed in two sittings.

The findings of the 3C test are listed in Tables 3A and 3B. The accuracy scores showed a range of from 51 to 99, a median of 96, and an average deviation of 5.31. The speed scores ranged from 22 to 95 minutes, the median was 47 minutes, and the average deviation was 11.05 minutes.

The findings of the 3D test are listed in Tables 4A and 4B. The accuracy scores showed a range of from 54 to 100, a median of 97, and an average deviation of 6.105. The speed scores showed a range of from 13 to 60 minutes, a median of 29 minutes, and an average deviation of 7.1 minutes.

The pupils accepted these results very philosophically and went to work as with the previous tests to drill where drill was needed. I helped wherever necessary, especially in promoting satisfying and pleasurable success.

TABLE 3 A

3C Addition ... Accuracy ... First Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100		0	4	0	0
99		5	3	15	45
98		5	2	10	20
97		7	1	7	7
96	M	4	0	0	0
95		6	- 1	- 6	6
93		1	- 3	- 3	9
92		2	- 4	- 8	32
91		1	- 5	- 5	25
90		2	- 6	- 12	72
88		1	- 8	- 8	64
79		1	- 17	- 17	289
65		1	- 31	- 31	961
61		1	- 35	- 35	1225
51		1	- 45	- 45	2025
		N = 38			38)4780(125.7894

……

Range = 51 to 99

Median = 96

S.D. = $\sqrt{125.7894}$ - 11.21

A.D. = 38)202(5.31

Table 3 A -

Showing distribution of 38 third grade pupils in accuracy in the "300 decade combinations to 39 + 9" on Jan. 4th. (Wilson 3C Addition Test)

This table is to be read as follows: No pupil had a score of 100%; 5 pupils had a score of 99; etc. The accuracy scores for the group ranged from 51 to 99; the median performance for the group was 96; the average deviation of the group was 5.31.

TABLE 3 B

3C Addition ... Speed (minutes) ... First Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
90 - 99.99	95	2	50	100	5000
80 - 89.99	85	1	40	40	1600
70 - 79.99	75	3	30	90	2700
60 - 69.99	65	0	20	0	0
50 - 59.99	55	9	10	90	900
40 - 49.99 M	45	15	0	0	0
30 - 39.99	35	6	- 10	- 60	600
20 - 29.99	25	2	- 20	- 40	800
		N = 38			38)11600(305.2631

……

Range = 22 to 95 minutes

Median = 47 "

S.D. = $\sqrt{305.2631}$ = 17.47 minutes

A.D. = 38)420(11.05 "

Table 3 B - Showing distribution of 38 third grade pupils in speed in the "300 decade combinations to 39 + 9" on Jan. 4th. (Wilson 3C Addition Test)

In this table, 2 pupils had a score above 90; 1 pupil had a score between 80 and 90; 3 pupils had a score between 70 and 80; etc. The speed scores for the group ranged from 22 to 95 minutes; the median performance for the group was 47 minutes; the average deviation of the group was 11.05 minutes.

TABLE 4 A

3D Addition ... Accuracy ... First Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100		2	3	6	18
99		8	2	16	32
98		6	1	6	6
97	M	4	0	0	0
96		2	- 1	- 2	2
95		5	- 2	- 10	20
94		4	- 3	- 12	36
93		0	- 4	- 0	0
92		1	- 5	- 5	25
89		1	- 8	- 8	64
83		1	- 14	- 14	196
64		1	- 33	- 33	1089
59		1	- 38	- 38	1444
58		1	- 39	- 39	1521
54		1	- 43	- 43	1849
		N = 38			38)6302(165.8421

……

Range = 54 to 100

Median = 97

S.D. = $\sqrt{165.8421} = 12.87$

A.D. = 38)232(6.105

Table 4 A - Showing distribution of 38 third grade pupils in accuracy in the "175 decade combinations as needed for carrying in multiplication to 9 x 9" on Jan. 18th. (Wilson 3D Addition Test)

This table is to be read as follows: Out of 38 pupils taking test, 2 pupils had an accuracy score of 100 %; 8 pupils had a score of 99; etc. The scores ranged from 54 to 100; the group median was 97; the average deviation of the group was 6.105.

TABLE 4 B

3D Addition ... Speed (minutes) ... First Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
60 - 64.99	62.5	1	35	35	1225
55 - 59.99	57.5	2	30	60	1800
50 - 54.99	52.5	0	25	0	0
45 - 49.99	47.5	2	20	40	800
40 - 44.99	42.5	2	15	30	450
35 - 39.99	37.5	1	10	10	100
30 - 34.99	32.5	9	5	45	225
25 - 29.99	M 27.5	14	0	0	0
20 - 24.99	22.5	5	- 5	- 25	125
15 - 19.99	17.5	1	- 10	- 10	100
10 - 14.99	12.5	1	- 15	- 15	225
		N = 38			38)5050(132.8947

……

Range = 13 to 60 minutes

Median = 29 "

S.D. = $\sqrt{132.8947}$ = 11.52 minutes

A.D. = 38)270(7.1 "

Table 4 B - Showing distribution of 38 third grade pupils in speed in the "175 decade combinations as needed for carrying in multiplication to 9 x 9" on Jan. 18th. (Wilson 3D Addition Test)

In this table, 1 pupil had a score between 60 and 65; 2 pupils had a score between 55 and 60; etc. The speed scores for the group ranged from 13 to 60 minutes; the median performance for the group was 29 minutes; the average deviation for the group was 7.1 minutes.

By this time, the class had met many of the process step difficulties and the pupils were learning to handle them with a fair amount of ease. Carrying, zeros, gaps, dollars and cents were encountered daily, great care being taken that only those facts and processes appeared with which the children had become sufficiently familiar thru drill. The class felt that it was making good headway and at the end of January, wished to try the next Wilson test. Accordingly, on February first, the Wilson 3P Test was given, testing the "process step difficulties".

Tables 5A and 5B give the results of this test. The accuracy scores showed a range of from 70 to 100, a median performance of 87, and an average deviation of 6.44. The speed scores ranged from 30 to 80 minutes; the class median was 41 minutes; and the average deviation was 8.02 minutes.

TABLE 5 A

3P Addition ... Accuracy ... First Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
95 - 100	97.5	7	10	70	700
90 - 94.99	92.5	8	5	40	200
85 - 89.99	87.5	M 9	0	0	0
80 - 84.99	82.5	6	- 5	- 30	150
75 - 79.99	77.5	4	- 10	- 40	400
70 - 74.99	72.5	3	- 15	- 45	675
65 - 69.99	67.5	1	- 20	- 20	400
		N = 38			38)2525(66.4473

……

Range = 70 to 100

Median = 87

S.D. = $\sqrt{66.4473} = 8.15$

A.D. = 38)245(6.44

Table 5 A - Showing distribution of 38 third grade pupils in accuracy in the "process step difficulties" on Feb. 1st. (Wilson 3P Addition Test)

This table is to be read as follows: Out of 38 pupils taking the test, 7 pupils had a score above 95; 8 pupils had a score between 90 and 94.99; etc. The scores for the group ranged from 70 to 100; the median performance for the group was 87; the average deviation of the group was 6.44.

TABLE 5 B

3P Addition ... Speed (minutes) ... First Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
80 - 84.99	82.5	1	40	40	1600
75 - 79.99	77.5	0	35	0	0
70 - 74.99	72.5	0	30	0	0
65 - 69.99	67.5	2	25	50	1250
60 - 64.99	62.5	2	20	40	800
55 - 59.99	57.5	1	15	15	225
50 - 54.99	52.5	4	10	40	400
45 - 49.99	47.5	2	5	10	50
40 - 44.99 M	42.5	9	0	0	0
35 - 39.99	37.5	12	- 5	- 60	300
30 - 34.99	32.5	5	- 10	- 50	500
		N = 38			38)5125(134.8684

……

Range = 30 to 80 minutes

Median = 41 "

S.D. = $\sqrt{134.8684}$ = 11.61 minutes

A.D. = 38)305(8.02 "

Table 5 B - Showing distribution of 38 third grade pupils in speed in the "process step difficulties" on Feb. 1st. (Wilson 3P Addition Test)

In this table, 1 pupil had a score between 80 and 84.99 minutes; no pupil had a score between 70 and 79.99 minutes; 2 pupils had a score between 65 and 69.99 minutes; etc. The speed scores for the group ranged from 30 to 80 minutes; the median performance for the group was 41 minutes; the average deviation of the group was 8.02 minutes.

In connection with the 3P Addition Test, a very careful analysis of the pupils' scores was made and tabulated for reference by the teacher in remedial work. This summary of the errors of individual pupils will be found in Table 6. The table is compiled as suggested in the Manual of Instruction that accompanies the Wilson Fact and Inventory and Diagnostic Tests in Arithmetic. The explanatory key on the next page, quoted from the Wilson 3P Addition Test, will help to interpret Table 6.

In analyzing the pupils' work, I had to keep in mind that "the reason for the mistake was not always obvious from the work itself; it was sometimes necessary to observe the pupil as he worked or to have him go over orally what he had done."

. . . .

Key to Table 6.

After the 3P Addition Test was given, each pupil's work was carefully analysized so that special individual help might be given where needed. Table 6 shows this analysis tabulated according to a plan suggested in the "Brief Manual of Instructions" which accompanies the Wilson Fact Inventory and Diagnostic Tests in Arithmetic. It is a summary which gives for each pupil in the third grade under consideration, the number of examples missed in each group of the Process Step Difficulties and the explicit nature of the errors in each pupil's work. The figures heading the columns under "groups" and "further errors" are in accordance with the Process Step Difficulties as listed on the fourth page of the Wilson 3P Addition Test as follows:

1. Primary combinations, sums to 9 + 9.
2. Upper decade facts, sums to 39 + 9.
3. Short columns, unseen addends, no zeros, sums to 18.
4. Short columns, unseen addends, with zeros, sums to 18.
5. Two place or three place numbers with no carrying, no zeros, or gaps.
6. Two or three place numbers without carrying but with zeros and gaps.
7. Two or three addends, both 2 and 3 place, carrying, sum of left hand columns less than 10, no zeros.
8. Columns, carrying, gaps, zeros, sums to 39 + 9.
9. Adding dollars and cents.
10. Higher decades needed for carrying in multiplication.

Further analysis of errors, supplementing the ten group steps:

11. Omitted one addend in adding
12. Reversed digits in putting down answer
13. Decade difficulty
14. Gets lost in column work above ... figures
15. Reading numbers wrongly
16. Bothered by dollar sign and decimal point
17. Failure to carry
18. Carrying wrong digit
19. Carried number put as extra in answer
20. Carrying wrong amount, too many or too few
21. Subtracting instead of adding
22. Counting
23. No regular habit, proceeding differently each time
24. Fails to observe column position
25. Derives unknown combination from familiar one

The use of this summary in interpreting a pupil's individual needs would read as follows: In Table 6, pupil No. 25 (approximate I.Q. 104) missed examples in groups 5, 7, 8, 9; made errors under types 17, 24; completed test in 37 minutes. This analysis gives a basis for the special individual help which Pupil No. 25 requires. It also presents a bird's-eye view of the needs of the class.

Table 6

Summary for First Test - 3P Addition

Pupil			Errors											Further Errors															
	I.Q.	Score	1	2	3	4	5	6	7	8	9	10	-	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Time
1.	132	87					1		1	4	7					.							.						46 min.
2.	123	83	1		1	1				5	7	2		.		.	.	.			.		.						65
3.	121	85			1	1			1	6	4	2				.			.										34
4.	119	81				1			1	8	9			.		.	.												34
5.	118	93				1	1			3	1	1		.						.							.		43
6.	118	79			2	1	1	1	3	7	5	1		.		.				.									60
7.	115	95			1					2	2					.				.	.								40
8.	115	86	1	1			1		3	4	3	1		.		.			.	.							.		43
9.	114	100																											31
10.	114	75			1	1	1		3	9	9	1		.		.	.											.	38
11.	113	82							6	6	6					.	.				.								41
12.	113	90				1	1		3	2	3			.						.			.						36
13.	112	93								4	2	1				.				.			.						36
14.	110	91							1	4	2	2		.		.				.									49
15.	110	80			2	1		1	1	9	5	1				.				.	.		.						36
16.	109	88			1	1				7	2	1				.				.							.		41
17.	109	87				1		1	1	3	6	1					.			.	.						.		39
18.	109	98							1	1										.									36
19.	108	89						1	1	5	4														.				39
20.	108	84	2		1				2	3	5	3		.		.				.									58
21.	106	100																											39
22.	106	77				1			4	7	8	3		.		.	.						.				.		51
23.	105	87	1			1	3		2	4	2						.			.	.								65
24.	104	77			1		1	2	5	7	5	2		.				.									.		37
25.	104	94					1		1	3	1									.							.		37
26.	103	68			1	3		2	3	10	10	3				.	.			.	.		.						43
27.	103	96					1			1	1	1				.							.					.	43
28.	102	98									2			.									.						31
29.	101	90		2		1				5	2			.		.							.		.				80
30.	98	86			1	2	1		2	3	4	1		.		.				.									40
31.	98	70			2	1	1	2	2	10	7	5		.						.			.				.	.	30
32.	96	76		2	1	2	1		6	7	4	1		.		.	.			.	.		.						36
33.	95	97				1					1	1		.									.						54
34.	94	73	1			1			2	10	10	3		.		.	.		.	.			.				.		35
35.	94	92								2	3	3		.		.				.			.						60
36.	87	92		1	1				1	2	2	1		.		.											.		52
37.	83	84					1		1	2	5	7				.	.			.			.						52
38.	76	72	1			1			8	10	7	1		.		.				.	.		.						41
Average		86.18																											43.97 "
Total errors			7	6	17	24	16	10	65	176	156	48		21	0	25	11	2	3	22	9	0	17	0	2	0	10	3	
Correct answer % in groups			98.15	98.42	95.52	93.68	95.78	97.36	82.89	53.68	58.94	87.36																	

Table 6 - This summary is for teacher's use in giving individual help after test. It shows for each pupil the number of examples missed in each group of the addition drill service and the errors which appeared in his work. (See explanatory key on previous page.)

During February and March, the drill procedure continued as outlined in the Wilson Addition Drill Service. By the first of April, the pupils felt that they were ready to try the Wilson Addition Tests again. They wished to find out before the April vacation how closely they were approaching their 100 % accuracy goal. Consequently the tests were given again during the first week in April.

On April first, the Wilson 3A Addition Test was repeated, testing again the "easier primary combinations". The accuracy scores of the group showed a 100 % accuracy score. The speed scores showed a range of from 2 to 8 minutes, a median of 4 minutes, and an average deviation of .789 minutes. (See Tables 7A and 7B.)

On April second, the Wilson 3B Addition Test was repeated, testing again the "difficult and zero combinations". The accuracy scores ranged from 99 to 100; the median was 100; and the average deviation was .026. The speed scores showed a range of from 3 to 10 minutes, a median of 6.5 minutes, and an average deviation of 1.44 minutes. (See Tables 8A and 8B.)

On April third, the Wilson 3C Addition Test was repeated, testing again the "300 decade combinations to 39 + 9". As before, this test was divided into three sections on account of its length. The accuracy scores showed a range of from 97 to 100, a median of 100, and an average deviation of .394. The speed scores ranged from 15 to 50 minutes; the median was 26 minutes; and the average deviation was 7.63 minutes. (See Tables 9A and 9B.)

On April fourth, the Wilson 3D Addition Test was repeated, testing again the "175 decade combinations as needed for carrying in multiplication to 9 x 9". Two sittings were required to complete this test. The accuracy scores showed a range of from 92 to 100, a median of 100, and an average deviation of .552. The speed scores ranged from 11 to 45 minutes; the median was 21 minutes; and the average deviation was 4.736 minutes. (See Tables 10-A and 10-B.)

TABLE 7 A

3A Addition ... Accuracy ... Re-Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100	M	38	0	0	0
		N = 38			

....

Range = 100

Median = 100

S.D. = 0

A.D. = 0

Table 7 A - Showing distribution of 38 third grade pupils according to accuracy scores achieved in a second testing in the "easier primary combinations" on April 1st after a period of drill with the Wilson Addition Drill Service.

This table is to be read as follows: Out of 38 pupils taking the test, 38 pupils had an accuracy score of 100 %.

(See Figure 2 for comparison of scores in the first and second testings with the Wilson 3A Addition Test.)

TABLE 7 B

3A Addition ... Speed (minutes) ... Re-Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
8		2	4	8	32
6		3	2	6	12
5		4	1	4	4
4	M	22	0	0	0
3		2	- 1	- 2	2
2		5	- 2	- 10	20
		N = 38			38)70(1.8421

....

Range = 2 to 8 minutes

Median = 4 "

S.D. = $\sqrt{1.8421}$ = 1.35 minutes

A.D. = 38)30(.789 "

Table 7 B - Showing distribution of 38 third grade pupils according to speed scores achieved in a second testing in the "easier primary combinations" on April 1st after a period of drill with the Wilson Addition Drill Service.

In this table, 2 pupils had a score of 8 minutes; 3 pupils had a score of 6 minutes; etc. The speed scores for the group ranged from 2 to 8 minutes; the median performance was 4 minutes; the average deviation was .789 minutes.

(See Figure 2 for comparison of scores in the first and second testings with the Wilson 3A Addition Test.)

TABLE 8 A

3B Addition ... Accuracy ... Re-Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100	M	37	0	0	0
99		1	- 1	- 1	1
		N = 38			38) 1(.026

....

Range = 99 to 100

Median = 100

S.D. = $\sqrt{.026}$ = .16

A.D. = 38) 1(.026

Table 8 A - Showing distribution of 38 third grade pupils according to accuracy scores achieved in a second testing in the "difficult and zero combinations" on April 2nd after a period of drill with the Wilson Addition Drill Service.

This table is to be read as follows: Out of 38 pupils taking the test, 37 pupils had an accuracy score of 100 %; 1 pupil had a score of 99%. The scores for the group ranged from 99 to 100; the median performance for the group was 100; the average deviation of the group was .026.

(See Figure 3 for comparison of scores in the first and second testings with the Wilson 3B Addition Test.)

TABLE 8 B

3B Addition ... Speed (minutes) ... Re-Testing

Score	Frequency	Deviation	F.D.	F.D.^{2}
10	3	3.5	10.5	36.75
9	1	2.5	2.5	6.25
8	2	1.5	3.	4.50
7	13	.5	6.5	3.25
M = 6.5				
6	5	- .5	- 2.5	1.25
5	8	- 1.5	- 12.	18.00
4	3	- 2.5	- 7.5	18.75
3	3	- 3.5	- 10.5	36.75
	N = 38			38)125.50(3.3026

……

Range = 3 to 10 minutes

Median = 6.5 "

S.D. = $\sqrt{3.3026}$ = 1.81 minutes

A.D. = 38)55(1.44 "

Table 8 B - Showing distribution of 38 third grade pupils according to speed scores achieved in a second testing in the "difficult and zero combinations" on April 2nd after a period of drill with the Wilson Addition Drill Service.

In this table, 3 pupils had a score of 10 minutes; 1 pupil had a score of 9 minutes; 2 pupils had a score of 8 minutes; etc. The speed scores for the group ranged from 3 to 10 minutes; the median performance was 6.5 minutes; the average deviation was 1.44 minutes.

(See Figure 3 for comparison of scores in the first and second testings with the Wilson 3B Addition Test.)

TABLE 9 A

3C Addition ... Accuracy ... Re-Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100	M	28	0	0	0
99		6	- 1	- 6	6
98		3	- 2	- 6	12
97		1	- 3	- 3	9
		N = 38			38)27(.7105

……

Range = 97 to 100

Median = 100

S.D. = $\sqrt{.7105}$ = .842

A.D. = 38)15(.394

Table 9 A - Showing distribution of 38 third grade pupils according to accuracy scores achieved in a second testing in the "300 decade combinations to 39 + 9" on April 3rd after a period of drill with the Wilson Addition Drill Service.

This table is to be read as follows: Out of 38 pupils taking the test, 28 pupils had an accuracy score of 100 %; 6 pupils had a score of 99 %; 3 pupils had a score of 98 %; etc. The scores for the group ranged from 97 to 100; the median performance for the group was 100; the average deviation of the group was .394.

(See Figure 4 for comparison of scores in the first and second testings with the Wilson 3C Addition Test.)

TABLE 9 B

3C Addition ... Speed (minutes) ... Re-Testing

Score		Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
50 - 54.99		52.5	1	25	25	625
45 - 49.99		47.5	4	20	80	1600
40 - 44.99		42.5	2	15	30	450
35 - 39.99		37.5	5	10	50	500
30 - 34.99		32.5	2	5	10	50
25 - 29.99	M	27.5	8	0	0	0
20 - 24.99		22.5	13	- 5	- 65	325
15 - 19.99		17.5	3	- 10	- 30	300
			N = 38			38)3850(101.3157

....

Range = 15 to 50 minutes

Median = 26 "

S.D. = $\sqrt{101.3157}$ = 10.06 minutes

A.D. = 38)290(7.63 "

Table 9 B - Showing distribution of 38 third grade pupils according to speed scores achieved in a second testing in the "300 decade combinations to 39 + 9" on April 3rd after a period of drill with the Wilson Addition Drill Service.

In this table, 1 pupil had a score between 50 and 54.99; 4 pupils had a score between 45 and 49.99; etc. The speed scores for the group ranged from 15 to 50 minutes; the median performance was 26 minutes; the average deviation was 7.63 minutes.

(See Figure 4 for comparison of scores in first and second testings with Wilson 3C Addition Test.)

TABLE 10 A

3D Addition ... Accuracy ... Re-Testing

Score		Frequency	Deviation	F.D.	F.D.^{2}
100	M	30	0	0	0
99		3	- 1	- 3	3
98		2	- 2	- 4	8
97		2	- 3	- 6	18
92		1	- 8	- 8	64
		N = 38			38)93(2.4473

......

Range = 92 to 100

Median = 100

S.D. = $\sqrt{2.4473}$ = 1.56

A.D. = 38)21(.552

Table 10 A - Showing distribution of 38 third grade pupils according to accuracy scores achieved in a second testing in the "175 decade combinations as needed for carrying in multiplication to 9 x 9" on April 4th after a period of drill with the Wilson Addition Drill Service.

This table is to be read as follows: Out of 38 pupils taking the test, 30 pupils had a perfect accuracy score of 100 %; 3 pupils had a score of 99 %; etc. The scores for the class ranged from 92 to 100; the median performance for the group was 100; the average deviation for the group was .552.

(See Figure 5 for comparison of scores in the first and second testings with the Wilson 3D Addition Test.)

TABLE 10 B

3D Addition ... Speed (minutes) ... Re-Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
45 - 49.99	47.5	1	25	25	625
40 - 44.99	42.5	0	20	0	0
35 - 39.99	37.5	1	15	15	225
30 - 34.99	32.5	3	10	30	300
25 - 29.99	27.5	5	5	25	125
20 - 24.99	M 22.5	14	0	0	0
15 - 19.99	17.5	11	- 5	- 55	275
10 - 14.99	12.5	3	- 10	- 30	300
		N = 38			38)1850(48.6842

……

Range = 11 to 45 minutes

Median = 21 "

S.D. = $\sqrt{48.6842}$ = 6.977 minutes

A.D. = 38)180(4.736 "

Table 10 B - Showing distribution of 38 third grade children according to speed scores achieved in a second testing in the "175 decade combinations as needed for carrying in multiplication to 9 x 9" on April 4th after a period of drill with the Wilson Addition Drill Service.

In this table, 1 pupil had a score between 45 and 49.99 minutes; no pupil had a score between 40 and 44.99 minutes; etc. The speed scores for the group ranged from 11 to 45 minutes; the median performance for the group was 21 minutes; the average deviation of the group was 4.736 minutes.

(See Figure 5 for comparison of scores in the first and second testings with the Wilson 3D Addition Test.)

On April fifth, the Wilson 3P Addition Test was repeated, testing again the "process step difficulties". The accuracy scores showed a range of from 90 to 100, a median of 99, and an average deviation of 1.21. The speed scores ranged from 17 to 55 minutes, with a median of 32 minutes, and an average deviation of 7.23 minutes. (See Tables 11-A and 11-B.)

A careful analysis of the second 3P Addition Test results showed that the pupils had gained greatly in knowledge and skill in both fact and process requirements. Many of their previous errors had been entirely eliminated and fewer pupils were having trouble with the more difficult process steps. In Table 12, a detailed summary is given of each pupil's work. It may be noted that errors now fell mostly under Type 8 (columns, carrying, gaps, zeros, sums to 39 + 9) and Type 9 (adding dollars and cents). With but few exceptions, the remaining errors were distributed under Type 13 (decade difficulty), Type 17 (failure to carry), Type 16 (bothered by dollar sign and decimal point), Type 20 (carrying wrong amount) and Type 24 (failure to observe column position). Table 12, when compared with Table 6, makes the improvement of the group very obvious. (The key on the page preceding Table 6 will help to interpret Table 12.)

TABLE 11 A

3P Addition ... Accuracy ... Re-Testing

Score	Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
98 - 100	99 M	26	0	0	0
96 - 97.99	97	6	- 2	- 12	24
94 - 95.99	95	2	- 4	- 8	32
92 - 93.99	93	3	- 6	- 18	108
90 - 91.99	91	1	- 8	- 8	64
		N = 38			38)228(6.

……

Range = 90 to 100

Median = 99

S.D. = $\sqrt{6}$ = 2.44

A.D. = 38)46(1.21

Table 11 A - Showing distribution of 38 third grade pupils according to accuracy scores achieved in a second testing in the "process step difficulties" on April 5th after a period of drill with the Wilson Addition Drill Service.

This table is to be read as follows: Out of 38 pupils taking the test, 26 pupils had an accuracy score above 98; 6 pupils had a score between 96 and 97.99; etc. The accuracy scores for the group ranged from 90 to 100; the median performance of the group was 99; the average deviation of the group was 1.21.

(See Figure 6 for comparison of scores in the first and second testings with the Wilson 3P Addition Test.)

TABLE 11 B

3P Addition ... Speed (minutes) ... Re-Testing

Score		Midpoint	Frequency	Deviation	F.D.	F.D.^{2}
55 - 59.99		57.5	1	25	25	625
50 - 54.99		52.5	0	20	0	0
45 - 49.99		47.5	4	15	60	900
40 - 44.99		42.5	4	10	40	400
35 - 39.99		37.5	5	5	25	125
30 - 34.99	M	32.5	10	0	0	0
25 - 29.99		27.5	6	- 5	- 30	150
20 - 24.99		22.5	5	- 10	- 50	500
15 - 19.99		17.5	3	- 15	- 45	675
			N = 38			38)3375(88.8157

……

Range = 17 to 55 minutes

Median = 32 "

S.D. = $\sqrt{88.8157}$ = 9.42 minutes

A.D. = 38)275(7.23 "

Table 11 B - Showing distribution of 38 third grade pupils according to speed scores achieved in a second testing in the "process step difficulties" on April 5th after a period of drill with the Wilson Addition Drill Service.

In this table, 1 pupil had a score of more than 55 minutes; no pupil had a score between 50 and 54.99; 4 pupils had a score between 45 and 49.99 minutes; etc. The speed scores for the group ranged from 17 to 55 minutes; the median performance for the group was 32 minutes; the average deviation of the group was 7.23 minutes.

(See Figure 6 for comparison of scores in the first and second testings with the Wilson 3P Addition Test.)

Table 12

Summary for Second Test - 3P Addition

Pupil			Errors											Further errors															
	I.Q.	Score	1	2	3	4	5	6	7	8	9	10	-	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Time
1.	132	100																											30 min.
2.	123	96							1	1	2							.			.		.						45
3.	121	97									3								.										27
4.	119	98									1	1		.		.													26
5.	118	98								1	1																.		26
6.	118	100																											55
7.	115	99									1					.													31
8.	115	95								1	4								.								.		38
9.	114	100																											18
10.	114	98								1	1																	.	40
11.	113	96							2		2					.													30
12.	113	100																											30
13.	112	100																											23
14.	110	100																											39
15.	110	96								3	1					.				.									31
16.	109	99										1				.													27
17.	109	97								1	2									.	.								32
18.	109	100																											32
19.	108	100																											26
20.	108	100																											42
21.	106	100																											23
22.	106	98									1	1				.											.		35
23.	105	96								2	2									.	.								48
24.	104	98								1	1																.		31
25.	104	100																											17
26.	103	93							1	2	3	1				.				.	.								37
27.	103	100																											20
28.	102	100																											19
29.	101	90		1		1		1		3	2	2		.		.									.				47
30.	98	99									1					.													22
31.	98	98									2												.						33
32.	96	99									1										.								21
33.	95	100																											47
34.	94	92							2	3	3					.				.			.						29
35.	94	100																											32
36.	87	99									1																.		42
37.	83	92							2	2	3	1								.			.						40
38.	76	94							1	2	2	1				.				.	.		.						38
Average		97.87																											32.34 "
Total errors			0	1	0	1	0	1	9	23	40	8		2	0	11	0	1	2	7	6	0	5	0	1	0	5	1	
Correct answer % in groups			100.	99.73	100.	99.73	100.	99.73	97.63	93.94	89.47	97.89																	

Table 12 - This summary is for teacher's use in noting individual improvement and in giving individual help after test. It shows for each pupil the number of examples missed in each group of the drill service and the errors which appeared in his work. (Compare with Table 6.)

Tables 13 and 14 set forth the results of the first and second testings in the Wilson Addition Tests so as to show a comparison of the range, median, standard deviation and average deviation achieved in each pair of tests in both accuracy and speed. These tables give group results. Here again the gain is obvious.

Figures 2, 3, 4, 5 and 6 compare the achievements of the group in accuracy and speed in both the first and second testings. The movement of the entire group from left to right indicates the growth of the pupils in Knowledge and skills.

Table 15 gives a comparison of the individual achievements of each member of the group and shows how each pupil improved upon his own record.

The children examined the results of the second testings with much satisfaction. They were highly pleased; but decided that there was still more work to be done. They were hopeful about reaching the 100 % accuracy goal before the end of the term.

TABLE 13

Comparison ... First and Second Tests ... Accuracy

Wilson Tests - 3A, 3B, 3C, 3D, 3P - Addition

Test	Range	Median	S.D.	A.D.	Date
3A					
1.	80 - 100	100	3.73	1.55	Nov. 1
2.	100	100	0	0	Apr. 1
3B					
1.	87 - 100	99	3.17	2.	Nov. 8
2.	99 - 100	100	.16	.026	Apr. 2
3C					
1.	51 - 99	96	11.21	5.31	Jan. 4
2.	97 - 100	100	.842	.394	Apr. 3
3D					
1.	54 - 100	97	12.87	6.105	Jan. 18
2.	92 - 100	100	1.56	.552	Apr. 4
3P					
1.	70 - 100	87	8.15	6.44	Feb. 1
2.	90 - 100	99	2.44	1.21	Apr. 5

Table 13 - To be read as follows: In the Wilson 3A Addition Test given on November first to a group of 38 third grade pupils, the accuracy scores ranged from 80 to 100; the median performance for the group was 100%; the standard deviation was 3.73; the average deviation was 1.55.

After an interval of special help and drill with the Wilson Addition Drill Service, the same pupils were re-tested on April first and achieved an accuracy score of 100 %, with a median of 100 % and a standard and average deviation of zero.

Etc.

TABLE 14

Comparison ... First and Second Tests ... Speed (minutes)

Wilson Tests - 3A, 3B, 3C, 3D, 3P - Addition

Test	Range	Median	S.D.	A.D.	Date
3A					
1.	4 - 12	7	2.	1.57	Nov. 1
2.	2 - 8	4	1.35	.789	Apr. 1
3B					
1.	5 - 15	8	2.507	1.815	Nov. 8
2.	3 - 10	6.5	1.81	1.44	Apr. 2
3C					
1.	22 - 95	47	17.47	11.053	Jan. 4
2.	15 - 50	26	10.06	7.63	Apr. 3
3D					
1.	13 - 60	29	11.52	7.10	Jan. 18
2.	11 - 45	21	6.977	4.736	Apr. 4
3P					
1.	30 - 80	41	11.61	8.02	Feb. 1
2.	17 - 35	32	9.42	7.23	Apr. 5

Table 14 - To be read as follows: In the Wilson 3A Addition Test given on November first to a group of 38 third grade children, the speed scores ranged from 4 to 12 minutes; the median performance of the group was 7 minutes; the standard deviation was 2 minutes; the average deviation was 1.57 minutes.

After a period of drill with the Wilson Addition Drill Service, a retesting on April first showed a class range of from 2 to 8 minutes, a median performance of 4 minutes, a standard deviation of 1.35 minutes, and an average deviation of .789 minutes.

Etc.

3A Addition

Easier Primary Combinations

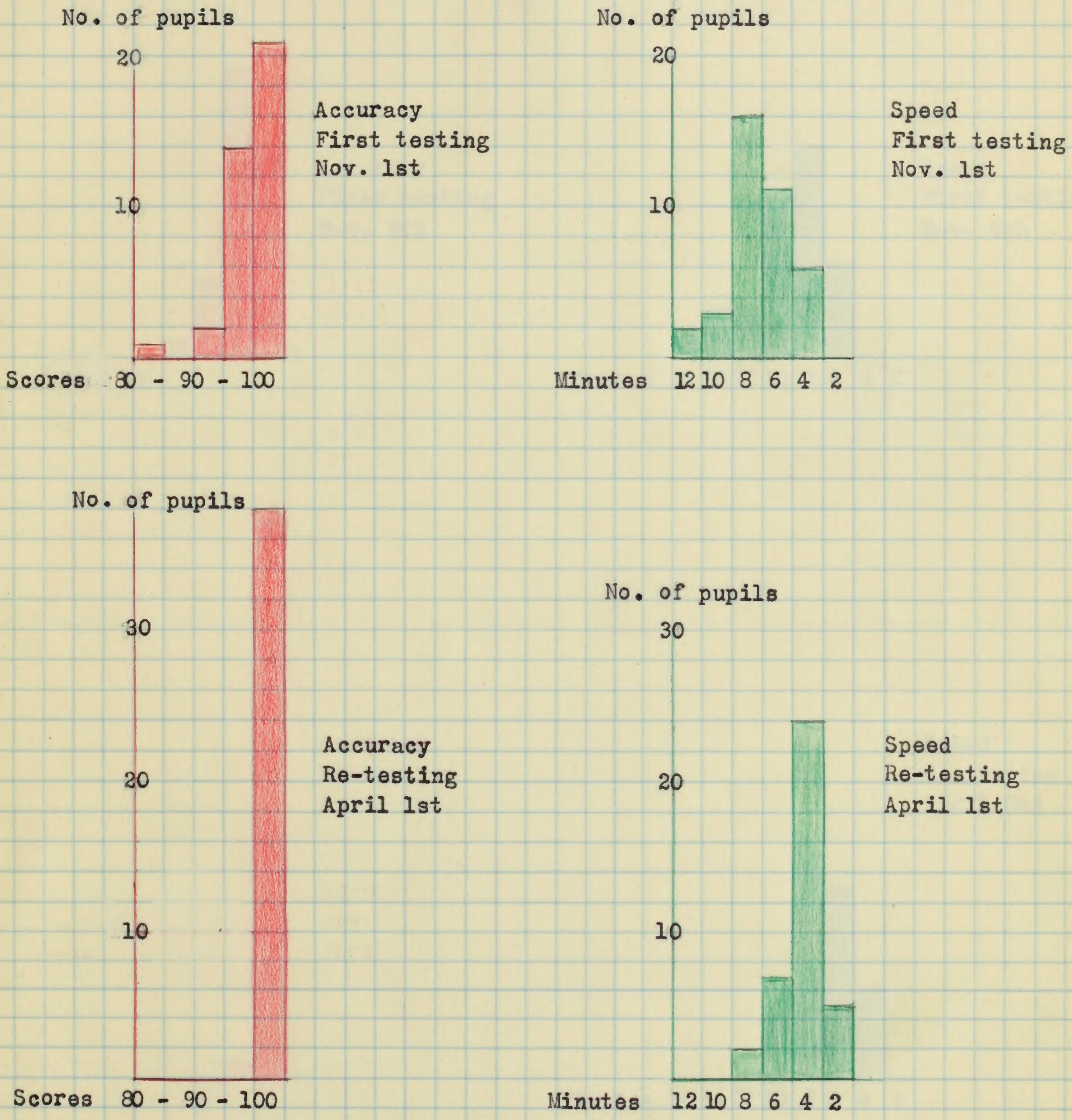


Figure 2 - To show the distribution and comparison of accuracy and speed scores achieved by 38 third grade pupils through testing and re-testing with the Wilson 3A Addition Tests.

3B Addition

Difficult and Zero Combinations.

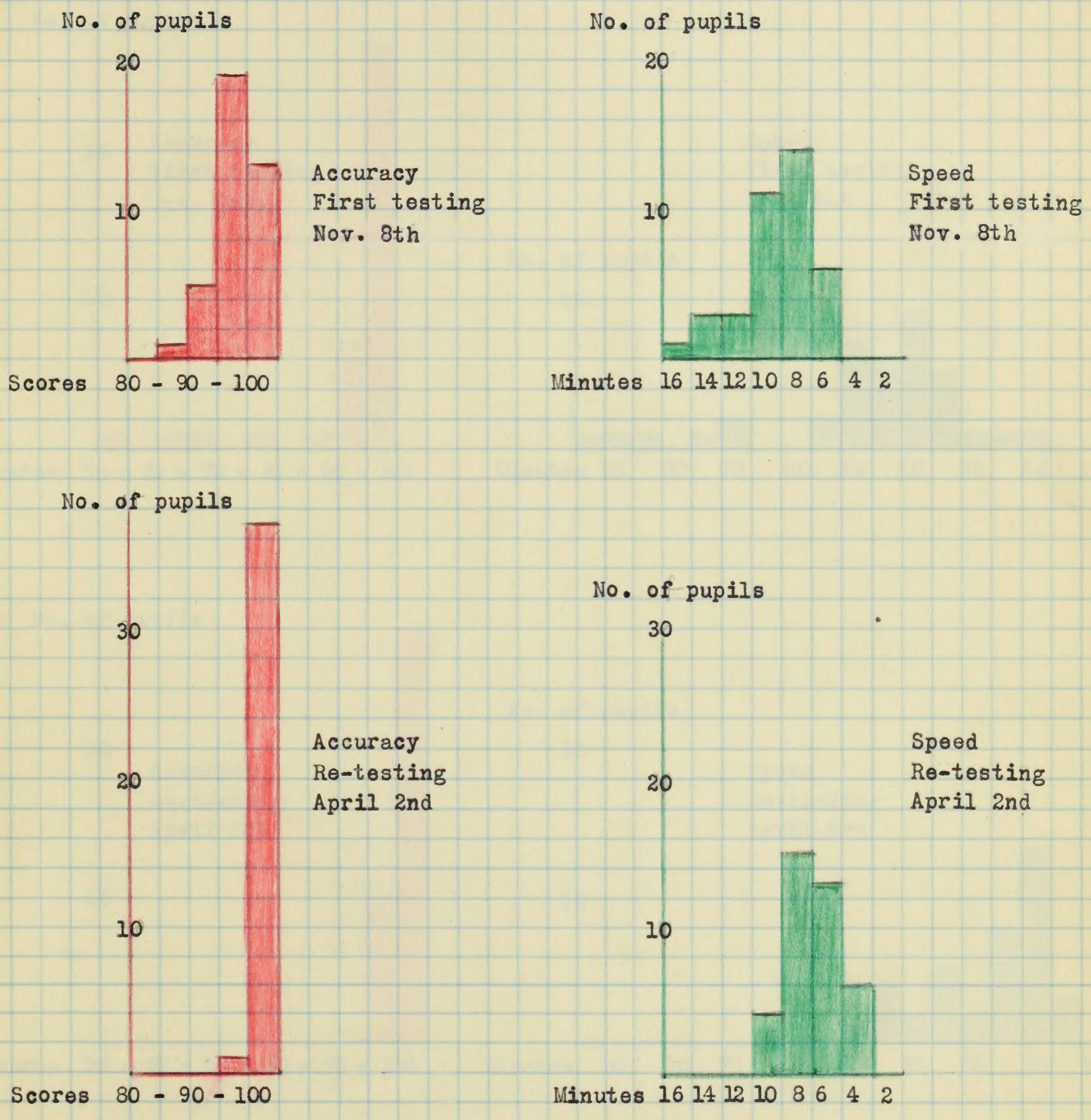


Figure 3 - To show the distribution and comparison of accuracy and speed scores achieved by 38 third grade pupils through testing and re-testing with the Wilson 3B Addition Tests.

3C Addition

The 300 Decade Combinations to 39 + 9.

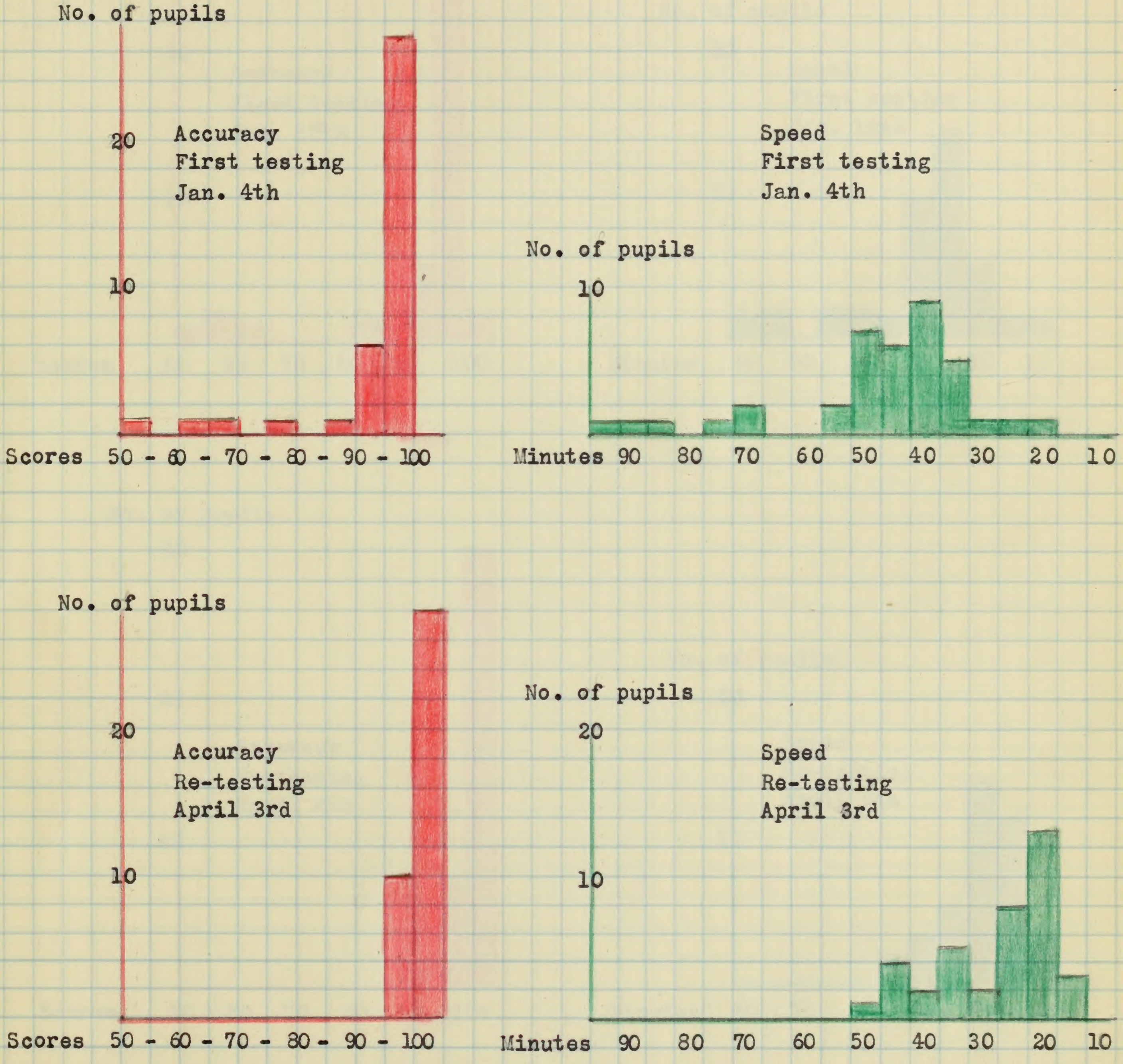


Figure 4 - To show the distribution and comparison of accuracy and speed scores achieved by 38 third grade pupils through testing and re-testing with the Wilson 3C Addition Tests.

3D Addition

The 175 Decade Combinations as Needed for Carrying in Multiplication to 9 x 9.

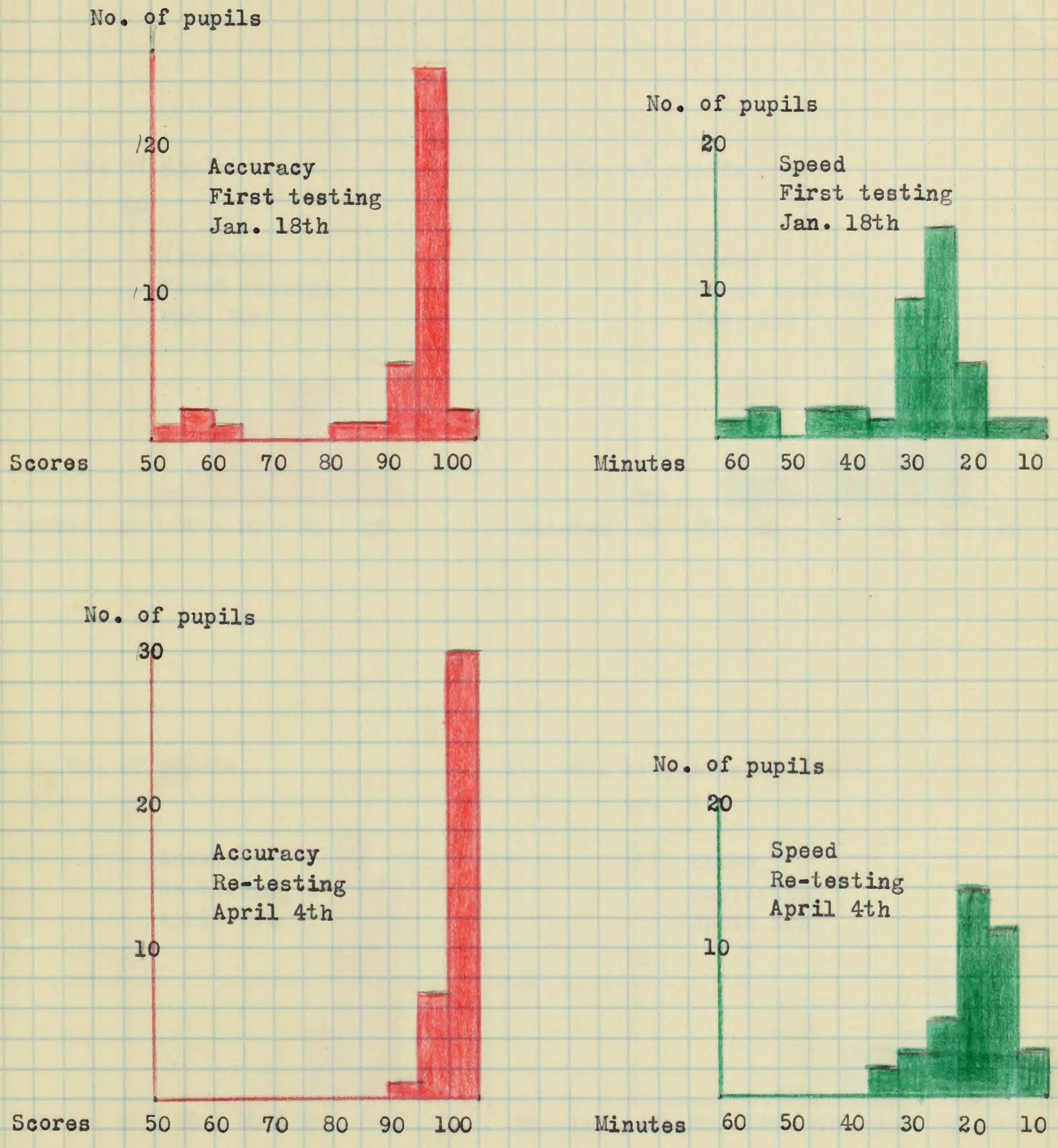


Figure 5 - To show the distribution and comparison of accuracy and speed scores achieved by 38 third grade pupils through testing and re-testing with the Wilson 3D Addition Test.

3P Addition

Process Step Difficulties

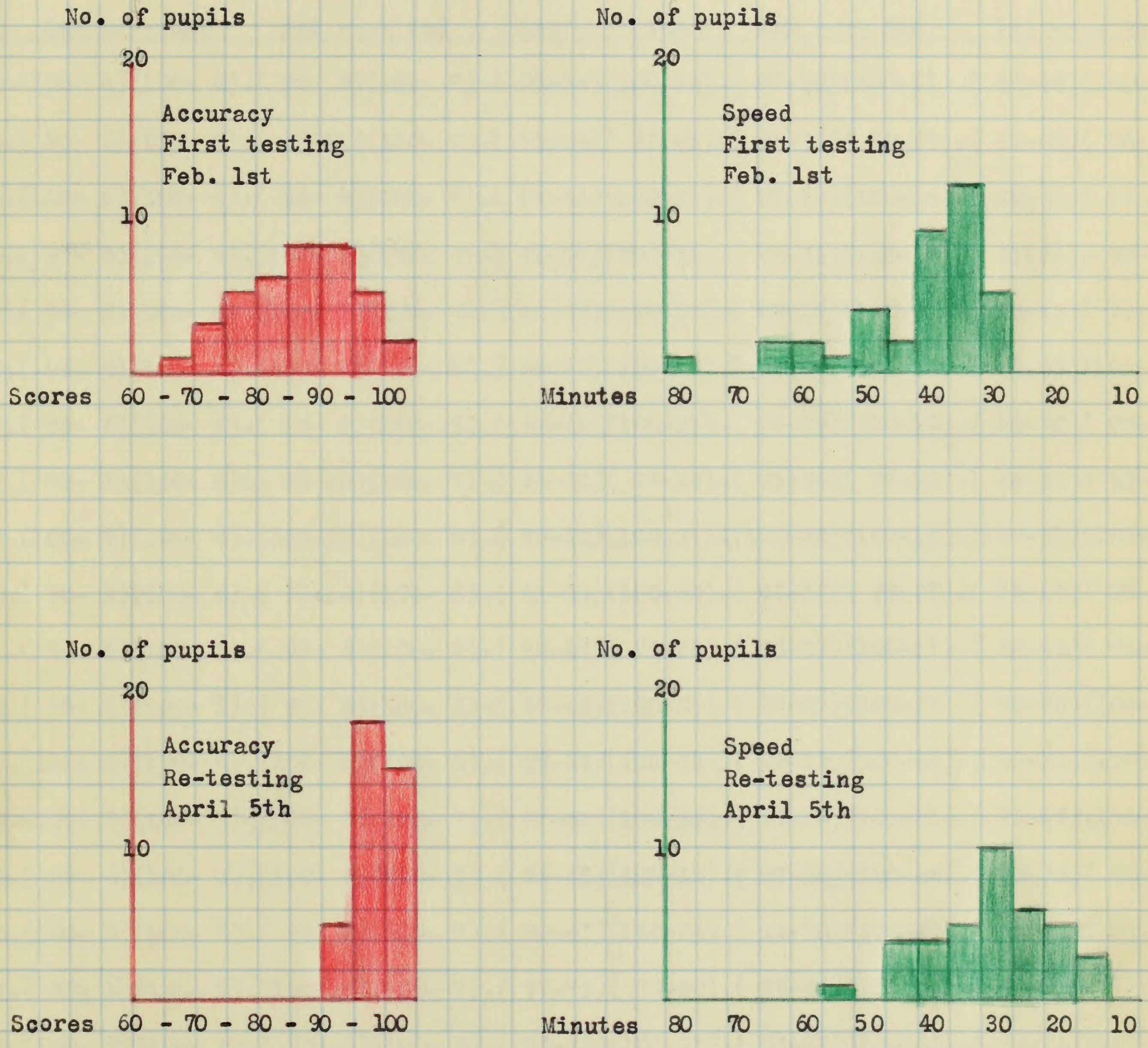


Figure 6 - To show the distribution and comparison of accuracy and speed scores achieved by 38 third grade pupils through testing and re-testing with the Wilson #3P Addition Tests.

TABLE 15

COMPARISON OF RESULTS OF FIRST AND SECOND TESTS

(Accuracy - Speed)

Pupils ranked according to approximate I.Q.

…………………………

Pupil	3A Addition		3B Addition		3C Addition		3D Addition		3P Addition	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
1.	(100- 4)	(100- 4)	(94- 8)	(100- 7)	(95-38)	(100-23)	(97-25)	(100-21)	(87-46)	(100-30)
2.	(98- 8)	(100- 5)	(93-11)	(100- 7)	(92-54)	(99-45)	(95-33)	(99-27)	(83-65)	(96-45)
3.	(100- 5)	(100- 4)	(94- 9)	(100- 7)	(96-44)	(100-21)	(99-28)	(100-16)	(85-34)	(97-27)
4.	(97- 5)	(100- 4)	(100- 6)	(100- 3)	(92-41)	(100-21)	(98-24)	(100-16)	(81-34)	(98-26)
5.	(93- 5)	(100- 4)	(100- 7)	(100- 6)	(97-35)	(100-23)	(99-24)	(100-17)	(93-43)	(98-26)
6.	(99- 8)	(100- 6)	(100- 8)	(100- 7)	(93-73)	(100-27)	(96-44)	(100-24)	(79-60)	(100-55)
7.	(92- 6)	(100- 4)	(96- 7)	(100- 6)	(96-46)	(100-22)	(95-29)	(100-18)	(95-40)	(99-31)
8.	(98- 7)	(100- 4)	(98-10)	(100- 7)	(95-52)	(99-34)	(95-34)	(99-23)	(86-43)	(95-38)
9.	(100- 7)	(100- 4)	(100-10)	(100- 5)	(98-52)	(100-37)	(100-34)	(100-19)	(100-31)	(100-18)
10.	(80- 9)	(100- 6)	(99-12)	(100- 8)	(61-50)	(100-28)	(64-34)	(98-27)	(75-38)	(98-40)
11.	(100- 4)	(100- 2)	(99- 8)	(100- 7)	(99-47)	(99-26)	(98-29)	(100-17)	(82-41)	(96-30)
12.	(99- 5)	(100- 2)	(97- 8)	(100- 6)	(97-42)	(100-25)	(99-25)	(100-17)	(90-36)	(100-30)
13.	(100- 4)	(100- 4)	(100- 5)	(100- 5)	(99-33)	(100-22)	(99-22)	(100-20)	(93-36)	(100-23)
14.	(100- 8)	(100- 5)	(98- 9)	(100- 7)	(97-42)	(100-24)	(99-25)	(100-21)	(91-49)	(100-39)
15.	(99- 6)	(100- 2)	(100- 6)	(100- 3)	(95-45)	(100-22)	(97-28)	(100-18)	(80-36)	(96-31)
16.	(100- 5)	(100- 4)	(98- 8)	(100- 7)	(90-47)	(100-24)	(94-30)	(100-23)	(88-41)	(99-27)
17.	(98- 8)	(100- 4)	(100-10)	(100- 7)	(97-76)	(99-40)	(99-48)	(100-23)	(87-39)	(97-32)
18.	(100- 7)	(100- 2)	(99- 9)	(100- 6)	(96-42)	(100-25)	(99-27)	(100-23)	(98-36)	(100-32)
19.	(100- 6)	(100- 4)	(99- 8)	(100- 5)	(98-45)	(100-28)	(98-28)	(100-21)	(89-39)	(100-26)
20.	(100- 7)	(100- 5)	(87-13)	(100-10)	(97-59)	(100-37)	(95-40)	(100-32)	(84-58)	(100-42)
21.	(100- 7)	(100- 4)	(96- 8)	(100- 6)	(98-39)	(100-32)	(99-29)	(100-22)	(100-39)	(100-23)
22.	(97- 7)	(100- 4)	(95- 8)	(100- 5)	(91-39)	(100-21)	(59-24)	(100-19)	(77-51)	(98-35)

(Continued on next page)

TABLE 15 (continued)

COMPARISON OF RESULTS OF FIRST AND SECOND TESTS

(Accuracy - Speed)

Pupils ranked according to approximate I.Q.

....

Pupil	3A Addition		3B Addition		3C Addition		3D Addition		3P Addition	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
23.	(100- 9)	(100- 4)	(97-13)	(100- 7)	(95-91)	(98-49)	(94-57)	(97-31)	(87-65)	(96-48)
24.	(98- 8)	(100- 4)	(98- 6)	(100- 4)	(95-53)	(100-38)	(92-32)	(100-21)	(77-37)	(98-31)
25.	(100- 6)	(100- 4)	(100- 7)	(100- 4)	(97-39)	(100-18)	(98-23)	(100-13)	(94-37)	(100-17)
26.	(97- 7)	(100- 4)	(99- 9)	(100- 7)	(90-46)	(99-27)	(54-28)	(92-25)	(68-43)	(93-37)
27.	(100- 4)	(100- 4)	(100- 6)	(100- 3)	(99-22)	(100-15)	(100-13)	(100-11)	(96-43)	(100-20)
28.	(100- 5)	(100- 4)	(100- 7)	(100- 5)	(99-29)	(100-18)	(98-18)	(100-13)	(98-31)	(100-19)
29.	(100-10)	(100- 5)	(94-15)	(100- 8)	(88-95)	(100-48)	(94-60)	(100-32)	(90-80)	(90-47)
30.	(100- 8)	(100- 4)	(91-10)	(100- 4)	(96-41)	(100-24)	(94-26)	(100-16)	(86-40)	(99-22)
31.	(100- 8)	(100- 4)	(100- 9)	(100- 7)	(53-43)	(99-38)	(83-26)	(99-21)	(70-30)	(98-33)
32.	(98- 4)	(100- 2)	(98- 6)	(100- 5)	(95-40)	(100-24)	(95-26)	(100-16)	(76-36)	(99-21)
33.	(100- 5)	(100- 3)	(100- 8)	(100- 5)	(97-43)	(100-38)	(97-30)	(100-25)	(97-54)	(100-47)
34.	(96- 8)	(100- 4)	(99-10)	(100- 7)	(98-51)	(100-23)	(97-34)	(100-20)	(73-35)	(92-29)
35.	(99- 4)	(100- 3)	(100- 7)	(100- 5)	(96-51)	(100-27)	(96-34)	(100-22)	(92-60)	(100-32)
36.	(98- 7)	(100- 6)	(98-10)	(99- 9)	(99-59)	(97-40)	(89-38)	(97-26)	(92-52)	(99-42)
37.	(100-12)	(100- 8)	(97-14)	(100-10)	(79-85)	(98-49)	(98-58)	(100-38)	(84-52)	(92-40)
38.	(100-11)	(100- 8)	(99-12)	(100-10)	(65-72)	(98-50)	(58-45)	(98-45)	(72-41)	(94-38)

Table 15 is to be read as follows: Pupil 1 (highest mental age in group) made an accuracy score of 100 % in 4 minutes at the first testing and an accuracy score of 100 % in 4 minutes at the second testing with the Wilson 3A Addition Test.

With the Wilson 3B Addition Test, the same pupil made an accuracy score of 94 % in 8 minutes at the first testing and an accuracy score of 100 % in 7 minutes at the second testing.

Etc.

....

The children's comprehension and execution of the plan outlined in the Wilson Addition Drill Service was a revelation to me. Their acceptance of the 100 % accuracy standard was perhaps not so remarkable; but the degree of initiative and self-direction which they displayed and their continued interest was most enlightening.

Interest in the success of our experiment with the Drill Service spread to the other third grade. This teacher has adopted it with excellent results.

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